

CLAIMS

This is a complete and current listing of the current claims marked with status identifiers in parentheses.

1. (Previously Presented) A data analysis system for determining a correlation model with a biological condition or a change in the biological condition probabilistically generated with time as an object variable and gene expression levels and/or quantities of intracellular substances as explanatory variables, the system comprising:

an input device for receiving a sample set including data on the biological condition or data from which the biological condition is derived, or data on the change in the biological condition probabilistically generated with time, and the expression levels of a plurality of genes and/or the quantities of intracellular substances;

(A) a selector for selecting explanatory variables;

(B) a calculator for calculating a result of cross validation with executing a partial least square method, or for calculating a result of cross validation with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs by applying a life table according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution;

(C) a judging device for judging adoption and non-adoption of the explanatory variables by assessing the result of the calculation by the calculation means; and

(D) a model decider for deciding a partial least square model by continuously improving a function having the result of the cross validation

of the partial least square model as at least one of independent variables by using the selection means (A), the calculation means (B) and the judging means (C).

2. (Previously Presented) The data analysis system according to Claim 1, wherein the object variable is the biological condition, the data received by said input means are the biological conditions or data from which the biological condition is derived, and the calculation means (B) calculates the cross validation with executing the partial least square method.

3. (Previously Presented) The data analysis system according to Claim 1, wherein the object variable is the change in the biological condition probabilistically generated with time, the data received by the input means are the data on the change in the biological condition probabilistically generated with time, and the calculation means (B) calculates calculating a result of cross validation with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs by applying a life table according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution;

4. (Previously Presented) The data analysis system according to Claim 1, further comprising a final model decision means for constructing a model of a statistical method or multivariate analysis method by using the explanatory variables adopted in the partial least square model determined by the decision means or latent variables of the partial least square model.

5. (Previously Presented) The data analysis system according to claim 1, wherein the explanatory variables are sequentially adopted or excluded by the selection means.

6. (Previously Presented) The data analysis system according to claim 1, wherein the explanatory variables are selected by using a genetic algorithm by the selection means.

7. (Previously Presented) The data analysis system according to claim 1, wherein the result of the cross validation is calculated with the partial least square method by excluding a sample in the calculation means sequentially.

8. (Previously Presented) The data analysis system according to claim 1, wherein the cross validation is calculated by applying the partial least square method by excluding a plurality of samples in the calculation means sequentially .

9. (Previously Presented) The data analysis system according to Claim 7, wherein the calculation means determines a representative value of an error between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample, and uses the error as an index of the cross validation.

10. (Previously Presented) The data analysis system according to claim 1, wherein the function is the result of the cross validation.

11. (Previously Presented) The data analysis system according to claim 1, wherein the function of the result of the cross validation and the number of the selected explanatory variables is used.

12. (Previously Presented) The data analysis system according to Claim 5, wherein the decision means repeats discriminative assessment by improving a function having the result of the cross validation as at least one of the independent variables.

13. (Previously Presented) The data analysis system according to claim 1, wherein the selection means (A) and the calculation means (B) comprise a plurality of computers.

14. (Previously Presented) A data analysis system further comprising another input means for receiving the correlation model determined in claim 1 and the explanatory variables adopted in the model on samples to be predicted, and a means for predicting and discriminating the biological condition of the samples based on the received explanatory variables.

15. (Previously Presented) The data analysis system according to Claim 2 wherein the object variable is the biological condition represented in nominal scale, ordinal scale or a continuous quantity.

16. (Previously Presented) The data analysis system according to Claim 4, wherein the statistical method or multivariate analysis method is a regression analysis method applied to a proportional hazard method or parametric distribution.

17. (Previously Presented) A data analysis method for determining a correlation model with a biological condition or a change in the biological condition probabilistically generated with time as an object variable and gene expression levels and/or quantities of intracellular substances as explanatory variables, the method comprising the steps of:

receiving a sample set including data on the biological condition or data from which the biological condition is derived, or data on the change in the biological condition probabilistically generated with time, and the expression levels of a plurality of genes and/or the quantities of intracellular substances;

(A) selecting the explanatory variables;

(B) calculating a result of cross validation by executing a partial least square method, or calculating a result of cross validation with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs when a life table is applied according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution;

(C) judging adoption and non-adoption of the explanatory variables by assessing the result of the calculation by the calculation in the calculating step (B); and

(D) deciding a partial least square model by continuously improving a function having the result of the cross validation of the partial least square model as at least one of independent variables by using the selecting step (A), the calculating step (B) and the judging step (C).

18. (Previously Presented) The data analysis method according to Claim 17, wherein the object variable is the biological condition, the data received in said input step are the biological conditions or data from which

the biological condition is derived, and the cross validation is calculated in the calculation step (B) with executing the partial least square method.

19. (Previously Presented) The data analysis method according to Claim 17, wherein the object variable is the change in the biological condition probabilistically generated with time, the data received in the input step are the data on the change in the biological condition probabilistically generated with time, and in the calculating step (B) the result of cross validation is calculated with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs by applying a life table according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution.

20. (Previously Presented) The data analysis method according to Claim 17 further comprising a step for constructing a model of a statistical method or a multivariate analysis method by using the explanatory variables adopted in the partial least square model determined by the decision means or latent variables of the partial least square model.

21. (Previously Presented) The data analysis method according to claim 17, wherein the explanatory variables are sequentially adopted or excluded in the selection step.

22. (Previously Presented) The data analysis method according to claim 17, wherein the explanatory variables are selected by using a genetic algorithm.

23. (Previously Presented) The data analysis method according to claim 17, wherein the result of the cross validation is calculated with the partial least square method by excluding one sample in the calculation step sequentially.

24. (Previously Presented) The data analysis method according to claim 17, wherein the result of the cross validation is calculated with the partial least square method by excluding a plurality of samples in the calculation step sequentially.

25. (Previously Presented) The data analysis method according to Claim 23, wherein in the calculation step a representative value of an error between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample is determined, and the error is used as an index of the cross validation.

26. (Previously Presented) The data analysis method according to claim 17, wherein the function is the result of the cross validation.

27. (Previously Presented) The data analysis method according to claim 17, wherein the function of the result of the cross validation and the number of the selected explanatory variables is used.

28. (Previously Presented) The data analysis method according to Claim 21, wherein in the decision step discriminative assessment is repeated by improving the function having the result of the cross validation as at least one of independent variables.

29. (Previously Presented) The data analysis method according to claim 17, wherein the selection step (A) and the calculation step (B) are executed in a plurality of computers.

30. (Previously Presented) A data analysis method comprising the steps of:

receiving the correlation model determined in claim 17 and explanatory variables adopted in the model on samples to be predicted, and predicting and discriminating the biological condition of the samples based on the received explanatory variables.

31. (Previously Presented) The data analysis method according to Claim 18 wherein the object variable is the biological condition represented in nominal scale, ordinal scale or a continuous quantity.

32. (Previously Presented) The data analysis method according to Claim 20, wherein the statistical method or multivariate analysis method used in the final model decision step is a regression analysis method applied to a proportional hazard method or parametric distribution.

33. (Previously Presented) A data analysis program executable in a computer for determining a correlation model with a biological condition or a change in the biological condition probabilistically generated with time as an object variable and gene expression levels and/or quantities of intracellular substances as explanatory variables, the program comprising the steps of:

receiving a sample set including data on the biological condition or data from which the biological condition is derived, or data on the change in the biological condition probabilistically generated with time, and the expression levels of a plurality of genes and/or the quantities of intracellular substances;

(A) selecting the explanatory variables;

(B) calculating a result of cross validation by executing a partial least square method, or calculating a result of cross validation with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs by applying a life table according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution;

(C) judging adoption and non-adoption of the explanatory variables by assessing the result of the calculation by the calculation in the calculating step (B); and

(D) deciding a partial least square model by continuously improving a function having the result of the cross validation of the partial least square model as at least one of independent variables by using the selecting step (A), the calculating step (B) and the judging step (C).

34. (Previously Presented) The data analysis program according to Claim 33, wherein the object variable is the biological condition, the data received in said input step are the biological conditions or data from which the biological condition is derived, and the cross validation is calculated in the calculation step (B) with executing the partial least square method.

35. (Previously Presented) The data analysis program according to Claim 33, wherein the object variable is the change in the biological condition probabilistically generated with time, the data received in the input step are the data on the change in the biological condition probabilistically generated with time, and in the calculating step (B) the result of cross validation is calculated with executing a partial least square method by using a conversion result as the object variable, the conversion result being obtained by converting a probability that no change occurs by

applying a life table according to Kaplan-Meier method or Cutler-Ederer method to the data on the change in the biological condition, based on or without an assumed distribution.

36. (Previously Presented) The data analysis program according to Claim 33 further comprising a step for constructing a model of a statistical method or multivariate analysis method by using the explanatory variables adopted in the partial least square model determined by the decision means or latent variables of the partial least square model.

37. (Previously Presented) The data analysis program according to claim 33, wherein the explanatory variables are sequentially adopted or excluded in the selection step.

38. (Previously Presented) The data analysis program according to claim 33, wherein the explanatory variables are selected by using a genetic algorithm.

39. (Previously Presented) The data analysis program according to claim 33, wherein the result of the cross validation is calculated with the partial least square method by excluding a sample in the calculation step sequentially.

40. (Previously Presented) The data analysis program according to claim 33, wherein the cross validation is calculated by applying the partial least square method by excluding a plurality of samples in the calculation method sequentially.

41. (Previously Presented) The data analysis program according to Claim 39, wherein in the calculation step a representative value of an error

between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample is determined, and the error is used as an index of the cross validation.

42. (Previously Presented) The data analysis method according to claim 33, wherein the function is the result of the cross validation.

43. (Previously Presented) The data analysis method according to claim 33, wherein the function of the result of the cross validation and the number of the selected explanatory variables is used.

44. (Previously Presented) The data analysis program according to Claim 37, wherein in the decision step discriminative assessment is repeated by improving the function having the result of the cross validation as at least one of independent variables.

45. (Previously Presented) The data analysis program according to claim 33, wherein the selection step (B) and the calculation step (C) are executed in a plurality of computers.

46. (Previously Presented) A data analysis program comprising the steps of:

receiving the correlation model determined in claim 33 and the explanatory variables adopted in the model on samples to be predicted, and predicting and discriminating the biological condition of the samples based on the received explanatory variables.

47. (Previously Presented) The data analysis method according to Claim 34 wherein the object variable is the biological condition represented in nominal scale, ordinal scale or a continuous quantity.

48. (Previously Presented) The data analysis method according to Claim 36, wherein the statistical method or multivariate analysis method used in the final model decision step is a regression analysis method applied to a proportional hazard method or parametric distribution.

49. (Previously Presented) The program according to Claim 37, wherein the explanatory variables are not included at all in an initial state in the selection step.

50. (Previously Presented) The program according to Claim 37, wherein the full explanatory variables are included in the initial state in the selection step.

51. (Previously Presented) The program according to claim 37, wherein the biological condition comprise a measured value representing a type of disease, a measured value representing degree of critical of disease, a result of diagnosis representing a type of disease, a result of diagnosis representing degree of critical of disease, or a value derived from one of them.

52. (Previously Presented) A computer readable recording medium which records the program according to claim 33.

53. (Previously Presented) An intracellular substance measuring device, wherein the device detects expression of at least one gene selected substantially in a gene group of gene bank accession numbers U15085,

M23452, X52479, U70426, H57330 and S69790, a detection method thereof, or a method for examining degree of critical of diffuse large cell lymphoma based on the detection.

54. (Previously Presented) The intracellular substance measuring device, the measuring method thereof, or the examining method according to Claim 53, wherein expression of at least one gene selected substantially from a gene group of gene bank accession numbers U03398, M65066, AK001546, BC003536, X00437, U12979, H96306, AA830781 and AA804793 is further detected.

55. (Previously Presented) An intracellular substance measuring device, wherein intracellular substances containing gene products comprising substantially genes of gene bank accession numbers AA598572, AA703058 and AA453345 are detected, a measuring method thereof, or a method for examining degree of critical of breast cancer based on the detection.

56. (Previously Presented) The intracellular substance measuring device, the measuring method thereof, or the examining method according to Claim 55, wherein intracellular substances containing substantially at least one gene product selected from a gene group of gene bank accession numbers AA406242, H73335, W84753, N71160, AA054669, N32820 and R05667 are further detected.

57. (Previously Presented) An intracellular substance measuring device wherein intracellular substances containing gene products comprising substantially genes of gene bank accession numbers W84753, H08581, AA045730 and AI250654 are detected, a measuring method

thereof, and a method for examining recurrence of breast cancer based on the detection.

58. (Previously Presented) The intracellular substance measuring device, the measuring method thereof, or the examining method according to Claim 57, wherein the intracellular substances containing substantially at least one gene product of genes selected from a gene group consisting of gene bank accession numbers AA448641, R78516, R05934, AA629838 and H53037 are further detected.

59. (Previously Presented) An intracellular substance measuring device, wherein intracellular substances containing gene products substantially comprising genes of gene bank accession numbers AA434397, T83209, N53427, N29639, AA485739, AA425861, H84871, T64312, T59518 and AA037488 are detected, a measuring method thereof, and a method for examining recurrence of breast cancer based on the detection.

60. (Previously Presented) The intracellular substance measuring device, the measuring method thereof, or the examining method according to Claim 60, wherein intracellular substances containing gene products substantially of a gene of gene bank accession number AA406231 are detected further.

61. (Previously Presented) An intracellular substance measuring device, wherein intracellular substances containing gene products substantially of genes of gene bank accession numbers H11482, T64312 and AA045340, a measuring method thereof, and a method for examining recurrence of breast cancer based on the detection.

62. (Previously Presented) The data analysis system according to Claim 8, wherein the calculation means determines a representative value of an error between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample, and uses the error as an index of the cross validation.

63. (Previously Presented) The data analysis method according to Claim 24, wherein in the calculation step a representative value of an error between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample is determined, and the error is used as an index of the cross validation.

64. (Previously Presented) The data analysis program according to Claim 40, wherein in the calculation step a representative value of an error between the object variable showing the biological condition predicted by the gene expression of the excluded sample in each calculation and the object variable showing the biological condition of the excluded sample is determined, and the error is used as an index of the cross validation.